HAEMATOLOGY AND BLOOD BIOCHEMISTRY OF THE BEARDED VULTURE (*GYPAETUS BARBATUS*) AND OTHER CARRION BIRD SPECIES

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INTRODUCTION

The bearded vulture is a raptor that belongs to the order of Falconiforms. It is adapted to live in mountain environments due to its need to nest on cliffs. Its diet is based almost entirely on bones of ungulates. The population in the Pyrenees is the most important within the European context. It is endangered: it is currently in a critical situation. Due to the population decline over the last few years, conservation and recovery plans have been made [4].

Haematology and biochemistry are useful diagnostic techniques in avian medicine: they are a good indicator of the general health of the bird and its adaptation to the environment. They are essential to both veterinarians and wildlife centres.

Table 1. Haematological and blood biochemistry values in nestling and adults of bearded vultures [3]

Parameter	Nestling	n	Adults	n
RBC (x10^{12}/l)	1,56 ± 0,30	12	2,91 ± 0,25	12
Haemoglobin (g/dl)	8,45 ± 2,0	12	16,41 ± 1,61	12
WBC (x10^{9}/l)	6,90 ± 3,19	12	9,72 ± 2,18	12
MCV (fl)	206,75±16,3	12	162,06 ± 12	12
Eosinophil (x10^{9}/l)	0,37 ± 0,25	12	0,30 ± 0,27	12
Uric acid (mg/dl)	4,81 ± 1,63	16	3,49 ± 1,96	12
Urea (mg/dl)	17,68 ± 8,88	17	11,98 ± 5,06	11
Triglycerides (mg/dl)	152,54 ± 67,51	20	50,53 ± 19,64	10
Cholesterol (mg/dl)	239,23 ± 62,58	20	198,03 ± 57,58	12
Magnesium (mg/dl)	1,77 ± 0,53	19	2,55 ± 0,52	11
Calcium (mg/dl)	9,68 ± 1,20	20	9,64 ± 0,67	11
Phosphorus (mg/dl)	6,46 ± 2,05	15	2,84 ± 0,84	7
AST (UI/l)	110,10 ± 33,50	21	170,3 ± 59,33	12
LDH (UI/l)	3099,47 ± 1437,47	21	1179,4 ± 386,04	12
CK (UI/l)	2645,10 ± 933,74	20	1254,1 ± 585,88	10
ALP (UI/l)	658,5 ± 395,71	21	59,86 ± 25,83	11
AMY (UI/l)	1179,22 ± 421,06	18	745,9 ± 250,22	10
LIP (UI/l)	62,22 ± 54,26	18	955,1 ± 221,38	10

OBJECTIVES

- ☑ To do a bibliographic search of the available information on haematology and biochemistry of bearded vultures
- ☑ To do a bibliographic search of the available information on haematology and biochemistry of other carrion bird species
- ☑ To compare the results of the parameters evaluated in all the species and to determine if they can be extrapolated

Figure 1. The flight of a bearded vulture (*Gypaetus barbatus*)

HAEMATOLOGY/BLOOD BIOCHEMISTRY FACTS OF THE BEARDED VULTURE

- Values do not differ between males and females [3]
- Adults have higher values of RBC and haemoglobin(lower MCV) than nestling as a result of an oxygen demand increase [3]
- Nestling have higher levels of urea, uric acid, cholesterol, triglycerides and most of hepatic enzymes due to the immaturity of the organs [3]
- Low phosphorus value due to its possible adaptation to its diet [3]
- The bearded vulture has a higher RBC (lower MCV) and lower values of total proteins and triglycerides compared to the other carrion birds [1][2][3][5][6][7]

Table 2. Haematological and blood biochemistry values in different species of adult carrion birds [1][2][3][5][6][7]

Parameter	Bearded vulture *(Gypaetus barbatus)*	Egyptian vulture *(Neophron percnopterus)*	Griffon vulture *(Gyps fulvus)*	Black vulture *(Aegypius monachus)*	Golden eagle *(Aquila chrysaetos)*	Andean condor *(Vultur gryphus)*
RBC (cell/m^3)	2.910.000	2.192.000	2.900.000	2.300.000	1.630.000	1.930.000
MCV (fl)	162,06	187,7	170,0 -170,19	170,3		254,33
Haemoglobin (g/dl)	16,41	13,7	15,1	18,3	9,17	18,83
Total protein (g/dl)	3,98	3,9 - 4,12	3,9 - 4	3,9 – 4,1	4,97	3,46
Glucose (mg/dl)	248,74	301,59 – 318,88	261 - 267	292,8 - 308	295,82 – 341,4	216,36
Uric acid (mg/dl)	3,49	3,86 - 5,18	5,5	5,4	7,69	5,16
Urea mg/dl)	11,98	6,70 - 7,90	8,16 - 9,5		7,6	
Triglycerides (mg/dl)	50,53	117,5 - 171,5	97,35	81,9	180,53	
Phosphorus (mg/dl)	2,83	3,69	4,3	2,44 – 2,8	5,3	4,34
Calcium (mg/dl)	9,64	10,3 – 10,8	9,3	9,98 – 11,4	9,5	10,8
LDH (U/l)	1170,4	629	254	908,1	1209,89	456,8
AST (U/l)	170,3	64,9	118,5	275	293,24	11,4
CK (U/l)	1254	1178,75	2740	3480	4112	509,8

CONCLUSIONS

1. Two available studies based on haematology and blood biochemistry of the bearded vulture. Therefore, further studies are needed in order to obtain reliable data to be used as reference values.
2. Evaluated parameters from the carrion birds are mostly similar to those from the bearded vultures and could be easily extrapolated. The differences found could be due to the living conditions.
3. Studies with standard protocols for extracting/analysing samples in carrion birds are needed to facilitate comparative studies

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